

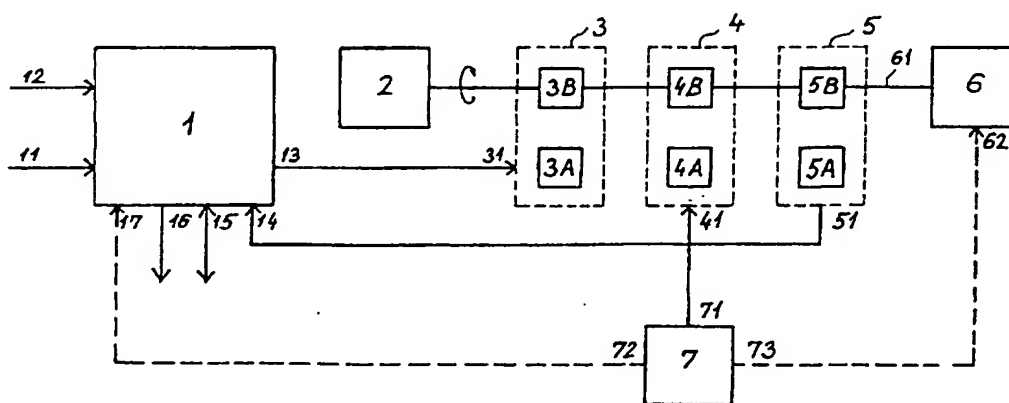


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**(54) Title:** ROTATIONAL DISPLAY EQUIPMENT**(57) Abstract**

The invention refers to a rotational display equipment, the central controlling unit (1) of which has a parametering input (11), an event perceiving input (12), a serial data output (13), rotation perceiving input (14), a programmable input and output line group (15) and an external equipment controlling output (16). The serial data output (13) of the central controlling unit (1) is connected to the serial data input (31) of the information transmission unit (3), and its rotation perceiving input (14) is connected to the output (51) of the rotation perceiving unit (5). Through the shaft (61) the information transmission unit (3) is connected to the rotating picture displaying unit (2) which is fixed on the shaft (61) and which has at least one propeller on the surface of revolution or in one plane and on its front there are at least five light-sources which display light with one or more colours and which are arranged in one, two or three lines at least on one side and which are along concentric circles while revolving and the electronics that control them. In a given case the second output (72) of the power supply unit (7) is connected to the central power voltage input (17) of the central controlling unit (1) and its third input (73) is connected to the external power voltage input (62) of the rotating unit (6).

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## ROTATIONAL DISPLAY EQUIPMENT

The invention is a rotational display equipment which can be well used for the complex display of multicoloured, moving, alpha-numeric and graphic  
5 information, cartoons, other animation, special effects activated with an external event at the same time, first of all for the purpose of calling people's attention.

Furthermore it is suitable for example for starting a program stored as an  
10 effect of movement perception in a given place and at the same time for activating for example a sound-giving device, and for operating external units at a programmed time and for a programmed period, for displaying the exact time, temperature, exchange rates, etc.

15 Apart from this - equipped with an appropriate adapter unit - it is suitable for example for displaying and/or creating the JACKPOT value in amusement arcades, or for showing various sights in the case when no game is played.

As it is known, there are several solutions and equipment for displaying  
20 advertisements, different information, animated series of pictures, moving images. The light sources used for these can be cathode ray tube, neon, halogen lamps, liquid crystal, LED-s, etc.

In a wide range of illuminated information equipment that represent the  
25 known technical level the so-called dot-matrix solution is used where the picture to be displayed is put together from picture dots. The advantage of these solutions is the quick operation, but their disadvantage is that a large number of light sources of the same colour are needed for lighting each picture dot for a determined period, and its price is rather high. There are also  
30 display boards that operate with halogen lamps, their disadvantage is that the

displayed picture is dim, it operates slowly, the solution demands a lot of energy and is also expensive.

The solution described in the patent application called "Switching  
5 arrangement for the operation control of illuminated information equipment" under the registration number: HU 196097 also represents the technical level. It is in connection with the prevention of the error that got into the illuminated paper working method data process (e.g. transferring from column to column) and with the transfer of multi-sided optional sample  
10 combinations in an optional direction, by providing the possibility of editing, controlling and correcting while the program goes on. This task is solved with a switching arrangement which has a data processing microprocessor, a feeding unit, a controlling unit, a data store, controlling and altering devices and a data-saving periphery, and the data store has a RAM and ROM area as  
15 well as a character screen store and a diagram screen store which are connected to the controlling unit and to the output unit. The disadvantage of this known solution is that all the scheduling, the storing of the data and the diagram display on the displaying board is controlled by the same microprocessor which allows operation only at a low speed, and it cannot  
20 correct the mistake on the displaying board in less time than 20 msec. Quick operation at an appropriate speed could only be achieved with a modern processor that would be very expensive and so it would increase the production cost of the whole equipment so much that it would make it impossible to sell it.

25

The aim of the intention is to terminate the disadvantages of the known solutions and to create a rotational display equipment that allows the combined display of multicoloured, moving, alpha-numeric and graphic information, cartoons, other animation, special effects at the same time  
30 generated with an external event, with a small number of light sources, on a

relatively large, active displaying surface that can be seen well, with a reliable construction, quick operation and economic production.

The solution of the invention is based upon the recognition that if a rotational display equipment is made from a revolving unit that consists of a non-moving part and a revolving part and has a directly or indirectly driven power shaft, from at least one rotation perceiving unit placed on the shaft, from an energy transmission unit, from an information transmission unit and from a central controlling unit and a revolving displaying unit also placed on the shaft, and the central controlling unit of this equipment stores all the large amount of data to be displayed as a picture in the picture memory unit of one of the data-processing central units in an off-line way and/or changes the picture that is just being displayed in an on-line way, and another data-processing central unit displays the picture ready to be displayed scheduled with a logical timing unit, with real-time playing, synchronised on a rotating picture displaying unit which has at least one propeller on the surface of revolution or in one plane: at least five light-sources which display light with one or more colours and which are arranged in one, two or three lines at least on one side on the front and which are along concentric circles while revolving; electronics that control them; for displaying an evenly rotating complete picture the central controlling unit has a PLL circuit synchronised on a rotation speed controlled from one or more rotation perceiving units and for preventing picture interruptions it has a picture shift compensation; LED-s as light sources which are driven directly by general buffers, then multicoloured, moving, alpha-numeric and graphic information, cartoons, other animation, special effects can be displayed at the same time, generated with an external event, with a small number of light sources, on a relatively large, active displaying surface that can be seen well, with a reliable construction, quick operation and economic production. Henceforward a picture or alpha-numeric information displayed on a rotating picture

displaying unit (projector) is meant by picture and a storing and bus-driving circuit is meant by general buffer.

5 So the invention is a rotational displaying equipment which has a revolving unit with a directly or indirectly driven power shaft, at least one rotation perceiving unit that perceives the situation and the rotating speed of the shaft and consist of a non-moving part and a revolving part, an energy transmission unit on the shaft consisting of a non-moving part and a revolving part and an information transmission unit consisting of a non-moving part and a revolving part on the shaft, and the first output of the power-unit is connected to the input of the energy transmission unit. The rotational display unit is characterised by that it has a central controlling unit with a parametering input, an event perceiving input, a serial data output, rotation perceiving input, an input and output line group that can be programmed and an external equipment controlling output. The serial data output of the central controlling unit is connected to the serial data input of the information transmission unit, and its rotation perceiving input is connected to the output of the rotation perceiving unit. Through the shaft the information transmission unit is connected to the rotating picture displaying unit which is fixed on the shaft and which has at least one propeller on the surface of revolution or in one plane and on its front there are at least five light-sources which display light with one or more colours and which are arranged in one, two or three lines at least on one side and which are along concentric circles while revolving and the electronics that control them.

25

In a given case the second output of the power supply unit is connected to the central power voltage input of the central controlling unit and its third input is connected to the external power voltage input of the rotating unit.

30 The central controlling unit is characterised by that its parametering input is connected to the CPU1 databus of the CPU1 data-processing central unit

through the output of the first buffer, its event perceiving input is connected to it through the output of the second buffer, its external controlling output through the input of the third buffer, its programmable input-output line group through the programmable input-output line group of the input-output unit, and its program and data storing unit is connected to it through the input-output line group.

The CPU1 databus is connected to the picture memory unit's address bus through the output of the fourth buffer, to the picture memory unit's picture memory databus through the input-output line group of the sixth buffer and to the CPU2 databus of the CPU2 data processing central unit through the output of the seventh buffer. The CPU2 databus is connected to the picture memory address bus through the output of the eighth buffer, and through the output of the fifth buffer the CPU1 address bus of the CPU1 data processing central unit is connected to the picture memory address bus which is connected to the parallel-series connection transformer input. The output of the parallel-series connection transformer is the serial data output of the central controlling unit at the same time. The rotation perceiving input of the central controlling unit is connected to one of the inputs of the CPU2 data processing central unit and to the input of the PLL circuit, and the output of the PLL circuit is connected to the other input of the CPU2 data processing central unit, and also it has a logical timing unit for the harmonised operation of the individual units, and in a given case it has an updating counter connected to the picture memory address bus through the output of the ninth buffer.

The rotating picture displaying unit is characterised by that its controlling electronics has an input unit to the input of which the output of the information transfer unit is connected, the output of the input unit is connected to the input of the first mono-stable multi-vibrator, the second mono-stable multi-vibrator and the shift-register data, the output of the first

mono-stable multi-vibrator is connected to the clock signal input of the shift-register. the output of the second mono-stable multi-vibrator is connected to the input of the third mono-stable multi-vibrator and to the clock signal input of the general buffer. the output of the third mono-stable multi-vibrator is  
5 connected to the enabling input of the general buffer.

The n-number, favourably eight, outputs of the shift-register are connected to the n-number, favourably eight, inputs of the general buffer. the n-number, favourably eight, driver parallel outputs of the general buffer are connected  
10 directly to the n-number, favourably eight, appropriate legs of the LED light source situated in one or more parallel lines and the appropriate leg of the n-number LED light sources is connected to the power voltage, and also it has a data output ensuring the connection of the shift-register with further light source blocks.

15

The rotational display equipment is also characterised by that for displaying complete pictures of smooth rotation the central controlling unit has a PLL circuit synchronised for rotation speed controlled from one or more rotation perceiving units.

20

The rotational display equipment is also characterised by that for preventing picture breaks the central controlling unit has a picture shift compensation.

The rotational display equipment is also characterised by that in order to  
25 create an approximately continuous picture free from flashing the light sources are situated on at least both sides of the rotating propeller. The rotational display equipment is also characterised by that the light sources are favourably LED-s in cases of the same colour and the optical colour mixing is realised by controlling the light of the light sources.



The rotational display equipment is also characterised by that in order to display on one shaft and on several planes the more than one propellers are positioned in the practically chosen plane.

- 5 The rotational display equipment is also characterised by that in order to display on two sides, so that the display can be seen from the front and the back, the rotating picture displaying unit has at least two rotating propellers rotating in two opposing directions, and it has the same amount of information transfer units and energy transfer units.

10

The rotational display equipment can be constructed large for putting on a roof, and then it is characterised by that in order to create display of different sizes the central controlling unit is put on the rotating picture display unit, and the information transfer unit has a programmable input and output line  
15 group.

The solution of the invention is described in more detail on the basis of the figures which are the following:

- 20 figure 1. shows the theoretical block plan of the rotational display equipment.  
figure 2. shows the block plan of a favourable construction form of the central controlling unit.  
figure 3. shows the block plan of a possible favourable construction form of the controlling electronics of the rotating picture display unit.  
25 figure 4. shows the front view of a possible construction form of the rotating propeller that creates the picture with LED-s of the same colour.

In figure 1. the theoretical block plan of the rotational display equipment can be seen, which has a rotating unit (6) with directly or indirectly driven power  
30 transmission shaft (61), at least one rotation perceiving unit (5) that perceives the position and the rotating speed of the shaft (61) and consists of a non-

- moving part (5A) and a rotating part (5B), an energy transfer unit (4) that consists of a non-moving part (4A) and a rotating part (4B), an information transfer unit (3) that consists of a non-moving part (3A) and a rotating part (3B), the first output (71) of the power supply unit (7) is connected to the input (41) of the energy transfer unit (4). The central controlling unit (1) has a parametering input (11), an event perceiving input (12), a serial data output (13), a rotation perceiving input (14), a programmable input/output line group (15), an external equipment controlling output (16) and an central power voltage input (17), its serial data input (13) is connected to the input (31) of the information transfer unit (3) and its rotation perceiving input (14) is connected to the output (51) of the rotation perceiving unit (5). Through the shaft (61) the information transfer unit (3) is in connection with the rotating picture displaying unit (2) which is fixed on the shaft, and on the rotating surface of which in one plane there is at least one rotating propeller on the front of which there are at least five light-sources which display light with one or more colours and which are arranged in one, two or three lines at least on one side and which are along concentric circles while revolving; and it has the electronics that control them. In the case that the central controlling unit (1) and the rotating unit (6) have not got an independent power supply, the second output (72) of the power supply unit (7) is connected to the central power voltage input (17) of the central controlling unit (1), and its third output (73) is connected to the external power voltage input (62) of the rotating unit (6).
- In figure 2. there is the block plan of a possible favourable construction form of the central controlling unit (1), its parametering input (11) is connected to the CPU1 databus (B2) of the CPU1 data processing controlling unit (1D1) on the output of the first buffer (1A1), its event perceiving input (12) on the output of the second buffer (1A2), its external controlling output (16) on the input of the third buffer 1A3), its programmable input/output line group (15)

on the programmable input/output line group of the input-output unit (1B), its program and data store unit (1C) on its input-output line group (1D1).

The CPU1 data bus (B2) is connected to the picture memory address bus (B3) of the picture memory unit (1E) through the output of the fourth buffer (1A4), to the picture memory databus (B4) of the picture memory unit (1E) through the input-output line group of the sixth buffer (A6), to the CPU2 databus (B5) of the CPU2 data processing central unit (1D2) through the output of the seventh buffer (A7). The CPU2 databus (B5) is connected to the picture memory address bus (B3) through the output of the eighth buffer (A8), the CPU1 address bus (B1) of the CPU1 data processing central unit (1D1) is connected to the picture memory address bus (B3) through the output of the fifth buffer (1A5), and the picture memory address bus (B3) is connected to the input of the parallel-series transformer (1G). The output of the parallel-series transformer (1G) is also the serial data output of the central controlling unit (1). The rotation perceiving input (14) of the central controlling unit (1) is connected to one of the inputs of the CPU2 data processing central unit (1D2) and to the input of the PLL circuit (1F), and the output of the PLL circuit (1F) is connected to the other input of the CPU2 data processing central unit (1D2). For the harmonised operation and control of the individual units it has a logical timing unit (1H), and in a given case, when the picture memory unit (1E) is not static but dynamic, it has an updating counter (1I) connected to the picture memory address bus (B3) through the output of the ninth buffer (1A9).

In figure 3, the block plan of a possible favourable construction form of the controlling electronics of the rotating display unit (2) can be seen, which has an input unit (2A). The output of the information transfer unit (3) is connected to the input of the input unit (2A), the output of the input unit (2A) is connected to the input of the first mono-stable multi-vibrator (2B1), the second mono-stable multi-vibrator (2B2) and the data input of the shift-register (2C), the output of the first mono-stable multi-vibrator (2B1) is

connected to the clock signal input of the shift register (2C), the output of the second mono-stable multi-vibrator (2B2) is connected to the input of the third mono-stable multi-vibrator (2B3) and to the clock signal input of the general buffer (2D), the output of the third mono-stable multi-vibrator (2B3) is connected to the enabling input of the general buffer (2D). The n-number, favourably eight inputs of the shift-register (2C) is connected to the n-number, favourably eight inputs of the general buffer (2D), the n-number, favourably eight parallel driver outputs of the general buffer (2D) is connected directly to the appropriate legs of the n-number LED F1, ... Fn light sources favourably positioned in one or more parallel lines, the appropriate leg of the n-number LED F1, ... Fn light source is connected to the power voltage (UT), and also the shift-register (2C) has a data output that ensures connection with further light source blocks.

Figure 4. shows the front view of a possible construction form of the rotating propeller that creates pictures with LED-s of the same colour, where the light sources of the same colour are positioned at least on both sides of the propeller in order to create an approximately continuous picture free from flashing, in two lines, in a "V"-shape, and on one side at the top, on the FP1, ... Fpi, ... Fpn side there are n-number red LED-s and at the bottom on the FZ1, ... Fzi, ... Fzn side there are n-number green LED-s, on the other side at the top, on the FZ1, ... Fzi, ... Fzn other side there are n-number green LED-s and at the bottom on the FP1, ... Fpi, ... Fpn other side there are n-number red LED-s.

25

The operation of the rotational display equipment is described on the basis of the diagrams.

The performance program is programmed - e.g. by computer - into the program and data store unit (1C) of the central controlling unit (1) through the programmable input-output line group (15) and through the input-output

unit (1B), this program contains the series of the pictures to be displayed by the user. Practically the program and data store unit (1C) has the following stores:

- 5    - ready-made cartoon,
- character generators with several types of shades and transparency,
- program needed for the operation of the CPU1,
- performance which is equipped with secret protection. so the loaded program cannot be read,
- 10   - it can be written and read.

In the picture memory unit (1E) the CPU1 data processing central unit (1D1) makes the data for the pictures to be displayed , which can be the following:

- 15   in the case of off-line display:
  - cartoons by picture elements (pictures squares),
  - alpha-numeric information,
  - in the case of movement along a circular arc. in the process of the picture of the whole text by units to be displayed that are bigger than a picture
- 20   element.
- in the case of radial movement each picture element must be stored separately in the case of on-line, real-time display (e.g. when displaying the time or other actual information, e.g. foreign exchange rate, JACKPOT prize):
- 25   - apart from the above the actual data (values) are also shown by off-line display put on each other at the same time.

In this way the data of every picture to be displayed is stored in the picture memory unit (1E), and the display is done from this so that the data stored in

30   the picture memory unit (1E) are started to be supplied on the output (51) of the rotation perceiving unit (5), through the rotation perceiving input (14) of

the central controlling unit (1), in at a pace determined and synchronised to rotate by the PLL circuit (1F). The picture display is controlled by the CPU2 data processing central unit (1D2), if it recognises the secret protection code, through the serial data output (13) of the parallel-series transformer (1G) and  
5 the output of the information transfer unit (3) so that the data of the pictures to be displayed are shown at the appropriate time on the rotating picture displaying unit (2). In this way the generation of the data and the display is done at the same time, timed by the logical timing unit (1H).

10 In the case that the picture memory unit that stores the picture (1E) is not static but dynamic memory, then permanent updating is needed which is done with the updating counter (1I).

The input unit (2A) of the rotating display unit (2) receives the serial data  
15 from the output of the information transfer unit (3), and with the leading edge of the sign that appears on its output it starts the first mono-stable multi-vibrator (2B1) whose output sign's trailer edge gives the point of time when it is necessary to take a sample of the output sign of the input unit (2A) to get a bit of the serial data.

20

The data input of the shift register (2C) is also connected to the output of the input unit (2A) and the output of the first mono-stable multi-vibrator (2B1) is connected to the clock signal input of the shift register (2C), and so the sample taking is realised at the appropriate time when a data bit gets in the  
25 shift register (2C).

The timing of the second mono-stable multi-vibrator (2B2) is set so that as long as data are arriving continuously on the output of the input unit (2A), the output signal of the second mono-stable multi-vibrator (2B2) is  
30 maintained continuously. If the second mono-stable multi-vibrator (2B2) does not receive any more prolonging signals, then its output signal is

emitted which writes all the data bit that is in the shift register (2C) into the general buffer (2D) at the same time at once. Then the third mono-stable multi-vibrator (2B3) enables the general buffer's (2D) n-number, favourable eight driver's parallel output, and the practically used n-number LED F1. ...

- 5 F<sub>n</sub> light source displays the picture elements of a radial column (pixel) on the rotating picture displaying unit (2). It is practical to set the delay time of the third mono-stable multi-vibrator (2B3) so that it is a square signal with a 1:1 packing fraction. (In this way it can be achieved that the picture elements are separated from each other in the displayed picture.)

10

In the case that you intend to display not separate picture elements, then the third mono-stable multi-vibrator (2B3) can be quitted and in this case the display will be brighter.

- 15 The outputs of the general buffer (2D) normally have high currenecy. (A light source block that consists of eight LED-s could be driven by a single general buffer (2D).) If this LED is not sufficient for the control of F1. ... F<sub>n</sub> light sources, then the output current can be doubled by the parallel connection of two general buffers (2D). In the air flow resulted by the rotation the LED-s  
20 can be loaded more than in other cases.

The independent in/outputs of the central controlling unit (1) are to influence the program of the CPU1 data processing central unit (1D1). so:

- 25 - with the manual operation of the parametering (11) it is possible to do practical program branches and/or to set and control data. e.g. if someone leaves, it perceives the movement, it displays what name-day it is that day, it plays music that suits the situation, it chirps, etc. and then it tells you the day's offer,  
30 - with the event perceiving input (12) it is possible to do the same electronically as with the manual operation of the parametering input (11),

- with the help of the programmable in/output line group (15) an external computer can be connected to the equipment and through this it is possible to load the performance given by the user,
- with the external equipment controlling output (16) it is possible to control, start and stop the equipment and devices (e.g. tape-recorder, twitter, etc.) that are connected to the equipment.

In the case of a favourable construction of the rotational display equipment the rotating unit (6) is practically a special electric motor which is mounted directly on the shaft (61) and rotates the propeller on the rotating picture displaying unit (2) so that the energy transferring unit (4) and the information transferring unit (3) are also mounted directly on the shaft (61). In this case, if the electric motor is loaded with a two-sided propeller, it rotates at just the right number of revolutions per minute. Of course it is possible to rotate in other ways as well, e.g. with a turbine, water, or air, and in this case the power supply unit (7) is not needed.

In the case of a practical construction of the energy transfer unit (4) the transfer of the 12 V direct voltage received on the first output (71) of the power supply unit (7) is done to the rotating picture displaying unit (2) with slip rings which are stabilised by a  $UT = 5\text{ V}$  stabiliser. Greater capacity can be transferred by a rotating transformer or a motor with a winded armature.

Practically the information transfer unit (3) is a rotating condenser, so the input unit (2A) is a high frequency conprator, but a slip ring can also be used for this purpose. The rotation perceiving unit is a revolution number counter that operates with an optical infra-red transmitter-receiver circuit and the PLL circuit (1F) connected to it gives the number of the columns. Practically the rotation perceiver (5) is situated on the shaft (61). In connection with the central controlling unit (1) it can be said - apart from the above - that where the picture parts meet (beginning-end) there is a shift of one picture element



which breaks the pictures or inscriptions when displayed, so to prevent this it has a picture shift compensation which is practically realised with a computer program.

- 5 The propeller(s) is (are) situated on the rotating picture displaying unit (2) and controlling electronics are needed for its (their) operation as it can be seen in figure No. 4. in connection with the favourable construction example. This solution is favourable, because the LED-s are positioned in a "V"-shape, along the diameters of concentric circles, along two crossing diagonals, the  
10 rotation is much more balanced because of the symmetric placement on the two sides and so an approximately continuous picture can be created free from flashing, and also the speed of the rotating picture displaying unit (2) need to be only half of the picture updating speed of the picture per LED-s. (By picture updating speed we mean how many times a complete picture is  
15 displayed by the used light sources.)

With the appropriate control of the red and green LED-s yellow colour can also be programmed, what is more, by modulating the time flashing, several shades can be created between red and green.

20

- The LED-s with cases of the same colour are more favourable than the multi-coloured ones and they are brighter. Another advantage is that blue and its shades can be created relatively cheaply with LED-s positioned in three lines, while in the case of traditional point-matrix display this is only possible with  
25 an extremely high number of LED-s and very expensively.

- If required propeller of several sides can also be used. In this case the central controlling unit (1) divides a picture to be displayed into as many parts as many sides there are. The propeller can be segment shaped, wave shaped,  
30 etc. instead of a plane. In the case of a large, several meters tall equipment that can be put on a roof, instead of LED-s any other light sources can be

used, e.g. with cathode ray tube, neon tube, etc. In this case the central controlling unit (1) is put on the rotating display unit (2) and the information transfer unit (3) has a programmable in/output group.

- 5 The rotational display equipment achieved its objectives and its advantages are the following:
- with a small number of light sources it displays a multi-coloured, complex picture, generated by an external event, in a combined, well visible, spectacular way.
- 10
- simple, reliable construction,
  - quick operation,
  - economic production.

## List of references

	1	central controlling unit
	2	rotating picture displaying unit
5	3	information transfer unit
	3A	non-moving part
	3B	rotating part
	4	energy transfer unit
	4A	non-moving part
10	4B	rotating part
	5	rotation perceiving unit
	5A	non-moving part
	5B	rotating part
	6	rotating unit
15	7	power supply unit
	11	parametering input
	12	event perceiving input
	13	serial data output
	14	rotation perceiving input
20	15	programmable in-output line group
	16	external equipment controlling output
	17	central power voltage input
	31	serial data input
	41	input
25	51	output
	61	shaft
	62	external power voltage input
	71	first output
	72	second output
30	73	third output
	1A1	first buffer
	1A2	second buffer

	1A3	third buffer
	1A4	fourth buffer
	1A5	fifth buffer
	1A6	sixth buffer
5	1A7	seventh buffer
	1A8	eighth buffer
	1A9	ninth buffer
	1B	input-output unit
	1C	program and data storing unit
10	1D1	CPU1 data processing central unit
	1D2	CPU2 data processing central unit
	1E	picture memory unit
	1F	PLL circuit
	1G	parallel-series transformer
15	1H	logical timing unit
	1I	updating counter
	B1	CPU1 address bus
	B2	CPU1 data bus
	B3	picture memory address bus
20	B4	picture memory data bus
	B5	CPU2 data bus
	2A	input unit
	2B1	first mono-stable multi-vibrator
	2B2	second mono-stable multi-vibrator
25	2B3	third mono-stable multi-vibrator
	2C	shift-register
	2D	general buffer
	F1 ... Fn	light sources
	FP1, ... FPi, ... Fpn	n-number red LED-s put on the one side
30	FZ1, ... FZi, ... Fzn	n-number green LED-s put on the one side
	FZ1, ... FZi, ... Fzn	n-number green LED-s put on the other side
	FP1, ... FPi, ... Fpn	n-number red LED-s put on the other side

## CLAIMS

1./ Rotational display equipment which has a rotating unit (6) with a directly or indirectly driven power shaft (61), at least one rotation perceiving unit (5) that perceives the situation and the rotating speed of the shaft (61) and consist of a non-moving part (5A) and a revolving part (5B), an energy transmission unit (4) put on the shaft, consisting of a non-moving part (4A) and a revolving part (4B), an information transmission unit (3) consisting of a non-moving part (3A) and a revolving part (3B), the first output (71) of the power-unit (7) is connected to the input (41) of the energy transmission unit (4),

characterised by that its central controlling unit (1) has a parametering input (11), an event perceiving input (12), a serial data output (13), rotation perceiving input (14), a programmable input and output line group (15) and an external equipment controlling output (16). The serial data output (13) of the central controlling unit (1) is connected to the serial data input (31) of the information transmission unit (3), and its rotation perceiving input (14) is connected to the output (51) of the rotation perceiving unit (5). Through the shaft (61) the information transmission unit (3) is connected to the rotating picture displaying unit (2) which is fixed on the shaft (61) and which has at least one propeller on the surface of revolution or in one plane and on its front there are at least five light-sources which display light with one or more colours and which are arranged in one, two or three lines at least on one side and which are along concentric circles while revolving and the electronics that control them. In a given case the second output (72) of the power supply unit (7) is connected to the central power voltage input (17) of the central controlling unit (1) and its third input (73) is connected to the external power voltage input (62) of the rotating unit (6).

2./ The rotational display equipment described in claim 1./.

characterised by that the central controlling unit's (1) parametering input (11) is connected to the CPU1 databus (B2) of the CPU1 data-processing central unit (1D1) through the output of the first buffer (1A1), its event perceiving input (12) is connected to it through the output of the second  
5 buffer (1A2), its external controlling output (16) through the input of the third buffer (1A3), its programmable input-output line group (15) through the programmable input-output line group (of the input-output unit (1B), and its program and data storing unit (1C) is connected to it through the input-output line group. The CPU1 databus is connected to the picture memory unit's (1E)  
10 picture memory address bus (B3) through the output of the fourth buffer (1A4), to the picture memory unit's (1E) picture memory databus (B4) through the input-output line group of the sixth buffer (1A6) and to the CPU2 databus (B5) of the CPU2 data processing central unit (1D2) through the output of the seventh buffer (1A7). The CPU2 databus (B5) is connected to  
15 the picture memory address bus (B3) through the output of the eighth buffer (1A8), and through the output of the fifth buffer (1A5) the CPU1 address bus (B1) of the CPU1 data processing central unit (1D1) is connected to the picture memory address bus (B3) which is connected to the parallel-series connection transformer input (1G). The output of the parallel-series  
20 connection transformer (1G) is the serial data output (13) of the central controlling unit (1) at the same time. The rotation perceiving input (14) of the central controlling unit (1) is connected to one of the inputs of the CPU2 data processing central unit (1D2) and to the input of the PLL circuit (1F), and the output of the PLL circuit (1F) is connected to the other input of the CPU2  
25 data processing central unit (1D2), and also it has a logical timing unit (1H) for the harmonised operation of the individual units, and in a given case it has an updating counter (1I) connected to the picture memory address bus (B3) through the output of the ninth buffer (1A9).

30 3./ The rotational display equipment described in claims 1. and 2.,

characterised by that the rotating picture displaying unit's (2) controlling electronics has an input unit (2A) to the input of which the output of the information transfer unit (3) is connected, the output of the input unit (2A) is connected to the data input of the first mono-stable multi-vibrator (2B1), the  
5 second mono-stable multi-vibrator (2B2) and the shift-register (2C), the output of the first mono-stable multi-vibrator (2B1) is connected to the clock signal input of the shift-register (2C), the output of the second mono-stable multi-vibrator (2B2) is connected to the input of the third mono-stable multi-vibrator (2B3) and to the clock signal input of the general buffer (2D), the  
10 output of the third mono-stable multi-vibrator (2B3) is connected to the enabling input of the general buffer (2D). The n-number, favourably eight, outputs of the shift-register (2C) are connected to the n-number, favourably eight, inputs of the general buffer (2D), the n-number, favourably eight, driver parallel outputs of the general buffer (2D) are connected directly to the  
15 n-number, favourably eight, appropriate legs of the LED light source (F1, ... Fn) situated in one or more parallel lines and the appropriate leg of the n-number LED light sources (F1, ... Fn) is connected to the power voltage (UT), and also it has a data output ensuring the connection of the shift-register (2C) with further light source blocks.

20

4./ The rotational display equipment described in claims 1-3.,  
characterised by that for displaying complete pictures of smooth rotation the central controlling unit (1) has a PLL circuit (1F) synchronised for rotation speed controlled from one or more rotation perceiving units (5).

25

5./ The rotational display equipment described in claims 1-4.,  
characterised by that for preventing picture breaks the central controlling unit (1) has a picture shift compensation.

30 6./ The rotational display equipment described in claims 1-5.,

**characterised by that** in order to create an approximately continuous picture free from flashing the light sources are situated on at least both sides of the rotating propeller.

5     7./ The rotational display equipment described in claims 1-6.,  
**characterised by that** the light sources are favourably LED-s in cases of the same colour and the optical colour mixing is realised by controlling the light of the light sources.

10    8./ The rotational display equipment described in claims 1-7.  
**characterised by that** in order to display on one shaft and on several planes the more than one propellers are positioned in the practically chosen plane.

9./ The rotational display equipment described in claims 1-8.,  
15   **characterised by that** in order to display on two sides, so that the display can be seen from the front and the back, the rotating picture displaying unit (2) has at least two rotating propellers rotating in two opposing directions. and it has the same amount of information transfer units (3) and energy transfer units (4).

20

10./The rotational display equipment described in claims 1-9.,  
**characterised by that** in order to create a large, several meters high display that can be put on a roof the central controlling unit (1) is put on the rotating picture display unit (2), and the information transfer unit (3) has a  
25   programmable input and output line group.



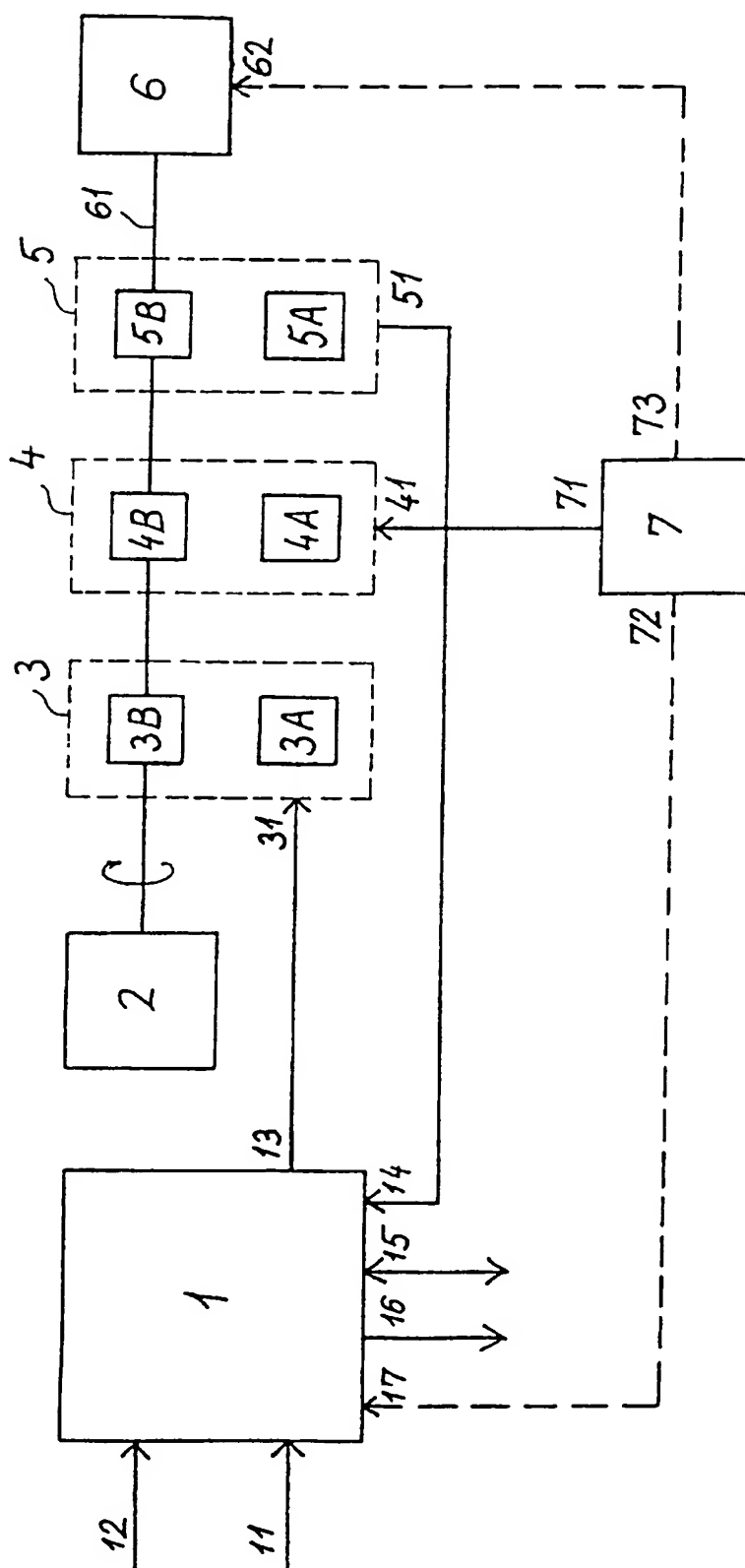
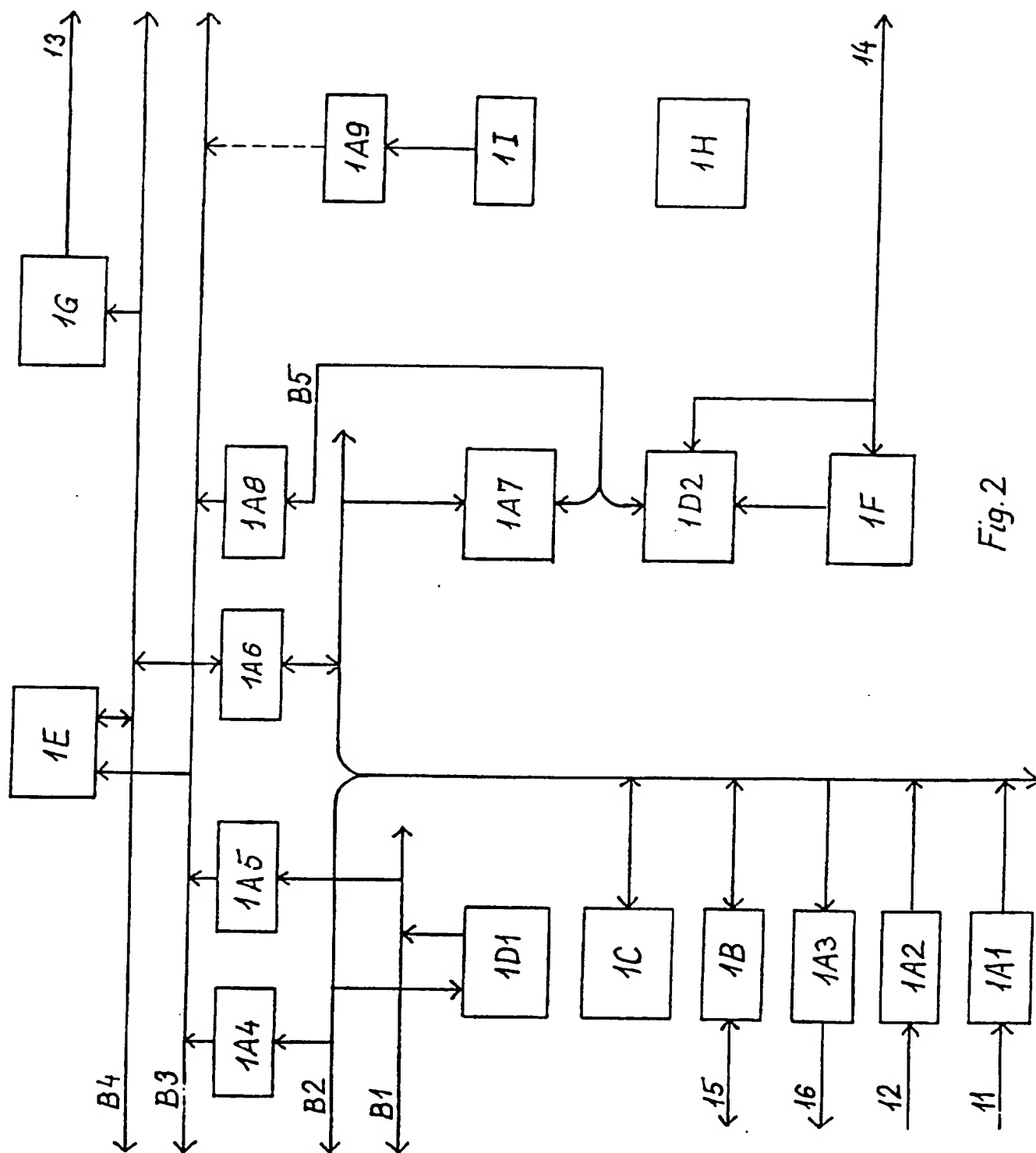


Fig. 1



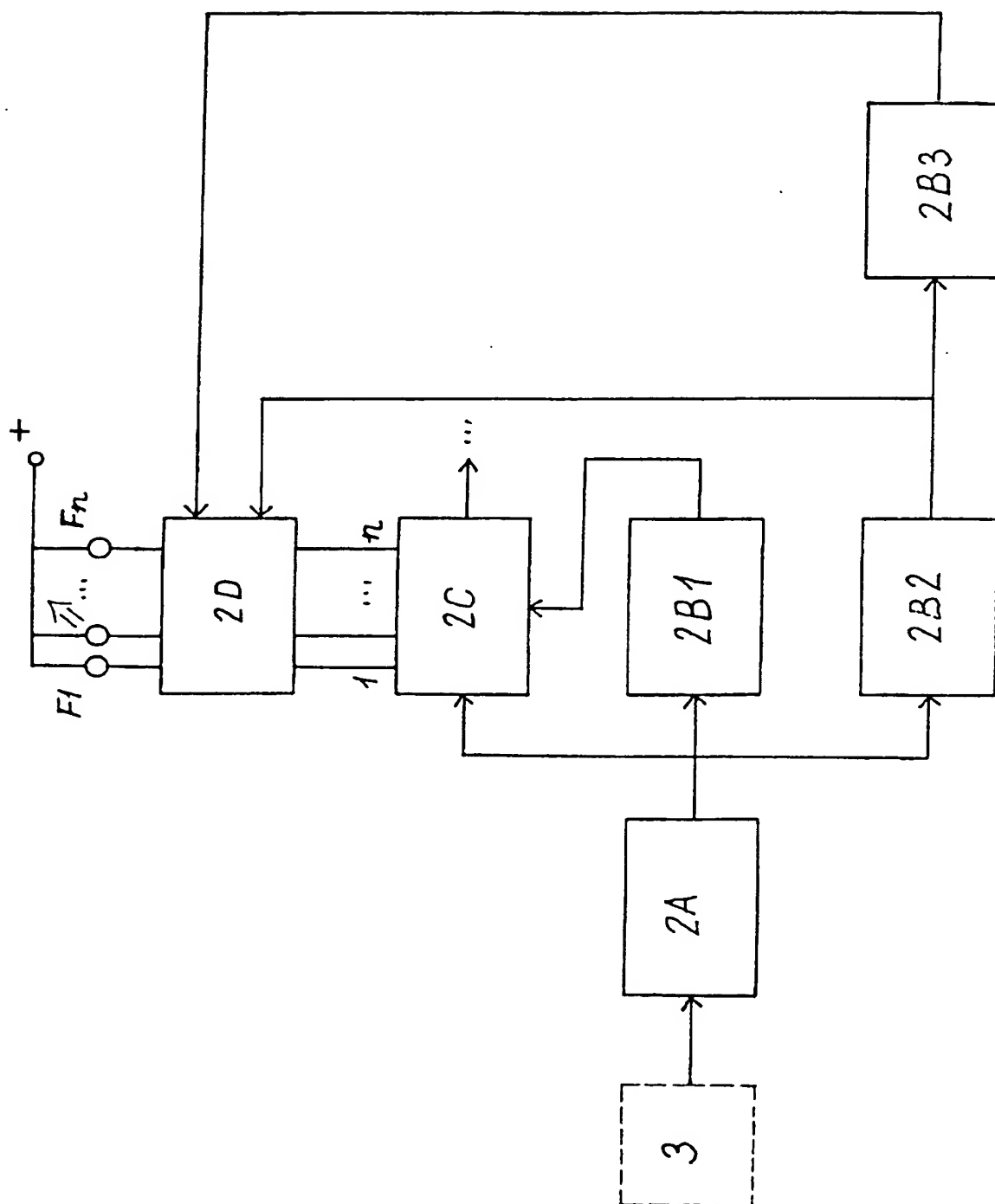


Fig. 3

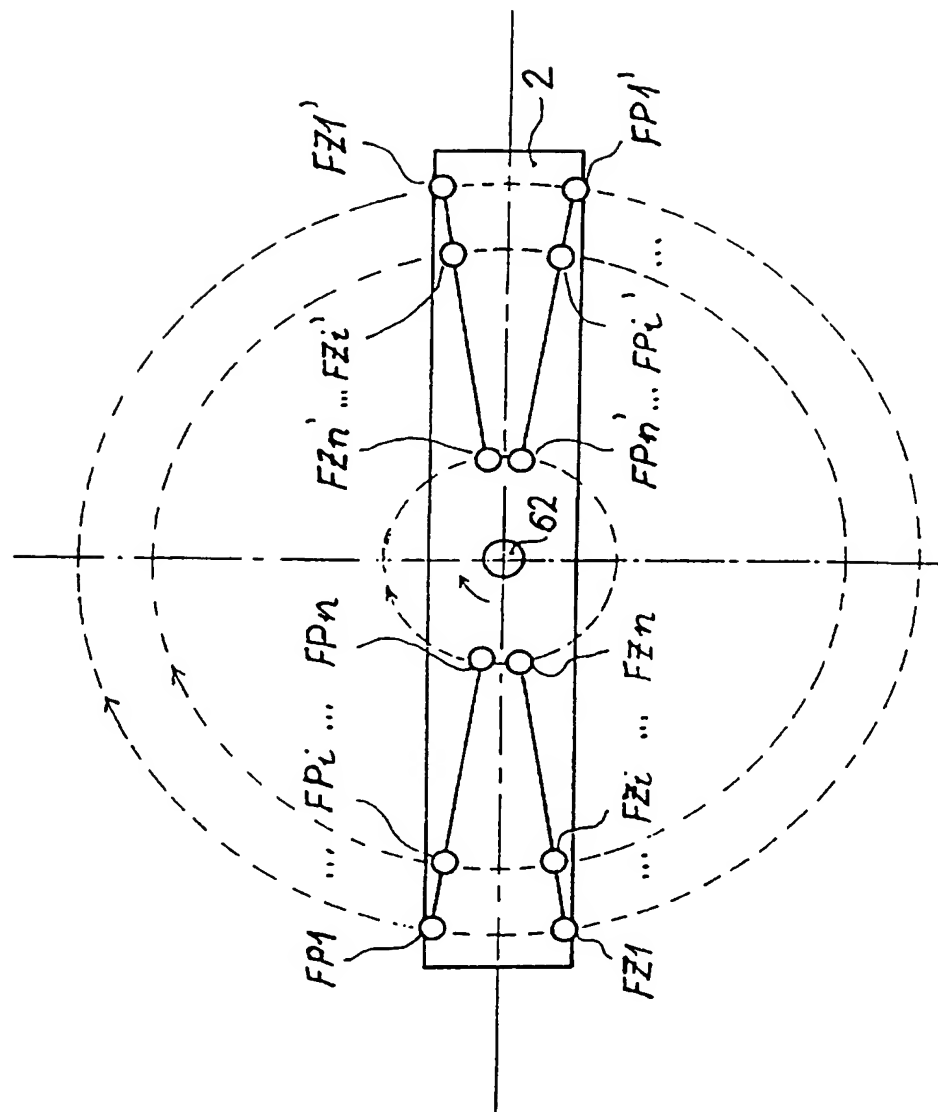


Fig. 4

## INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/HU 97/00055

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 G09G3/00 G09F9/33

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 G09G G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 90 12354 A (STELLAR COMMUNICATIONS LTD.) 18 October 1990 see page 5, line 17 - page 17, line 22; figures 2-7	1-4,6,7
A	--- GB 2 207 796 A (YUEN ET AL.) 8 February 1989 see page 5, line 12 - page 9, line 13 see page 10, line 10 - line 24 see page 19, line 7 - page 21, line 17; figures 1,2,4,18	1,2,5-8
A	--- US 5 057 827 A (NOBILE ET AL.) 15 October 1991 see column 3, line 10 - column 7, line 26; figures 1-4,8	1-3,6,7, 10
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Date of the actual completion of the international search

22 January 1998

Date of mailing of the international search report

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A	US 4 160 973 A (BERLIN) 10 July 1979 see the whole document ---	1-4,7
A	GB 2 277 189 A (NAKAMATSU) 19 October 1994 see page 4, line 17 - page 5, line 20; figures 5,6 ---	1,6,7,10
A	EP 0 156 544 A (E-TEK LTD.) 2 October 1985 see page 3, line 31 - page 12, line 14; figures 1-4 ---	1,3,6,7
A	EP 0 703 558 A (AVIX INC.) 27 March 1996 see column 10, line 55 - column 12, line 6; figures 8,9 -----	1,3,7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/HU 97/00055

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9012354 A	18-10-90	AT 109288 T	15-08-94
		AU 644070 B	02-12-93
		AU 5447390 A	05-11-90
		CA 2050891 A	14-10-90
		DE 69011104 D	01-09-94
		DE 69011104 T	17-11-94
		EP 0466795 A	22-01-92
		ES 2061029 T	01-12-94
		JP 4504624 T	13-08-92
		US 5302965 A	12-04-94
-----			
GB 2207796 A	08-02-89	CN 1030990 A	08-02-89
		EP 0301870 A	01-02-89
		JP 1105991 A	24-04-89
		US 5041947 A	20-08-91
-----			
US 5057827 A	15-10-91	NONE	
-----			
US 4160973 A	10-07-79	NONE	
-----			
GB 2277189 A	19-10-94	JP 6301349 A	28-10-94
		DE 4412520 A	01-12-94
		FR 2705157 A	18-11-94
-----			
EP 156544 A	02-10-85	NONE	
-----			
EP 703558 A	27-03-96	JP 8097969 A	12-04-96
		CN 1127391 A	24-07-96
		US 5670971 A	23-09-97
-----			

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